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The reaction of carbon dioxide with powderized calcium oxide has been studied, since it has been observed that these reactants produce a marble-like layer on surfaces when produced in the presence of water vapor. The experiments were made at temperatures of 100°, 200°, 300°, and 400°C. It was found that the most favorable temperature was between 200° and 300°C, while a higher temperature was unsuited due to the reversibility of the reaction. The result shows that fillers might have to be added to the initial CaO to avoid cracks in the final product.

As is known, calcium oxide in a finely dispersed state on interacting with water forms a quite strongly-binding mass, which in its appearance approaches hardened cement. The process of the interaction of such a hardened mass with carbon dioxide in air leads to a gradual carbonization of the surface, as a result of which a strong lustrous surface is produced. These circumstances permit us to assume that the interaction of finely dispersed calcium oxide with carbon dioxide in the presence of water vapors can, under certain conditions, lead to the formation of a solid strong mass similar to marble. In this connection, the purpose of this investigation was to set up the first exploratory experiments to study the reaction of carbon dioxide with powdered calcium oxide

* Numbers in the margin indicate pagination in the original foreign text.

in the presence of water vapor.

For this purpose, pressed powdered CaO was placed in a metal cylinder with an air-tight screw cap, equipped with three drain tubes with stopcocks. One tube was connected to a cylinder with CO_2, the second to a boiler, and the third served to release the gases. By regulating the discharge of gases by the stopcock it was not difficult to establish within the cylinder a constant pressure which was recorded by a manometer. To lead water vapor into the cylinder, the boiler was heated to a temperature such that the equilibrium pressure of the water vapor somewhat exceeded the prescribed pressure in the cylinder. The cylinder with the calcium oxide was placed in a heating furnace in which a constant prescribed temperature was maintained during the experiment.

The carbonization reaction was carried out at 100°, 200°, 300°, and 400°C /129 at a carbon-dioxide pressure of 2 atm and 3 atm. The experiments lasted 1.2 and 3 hours. After the experiment the quantity of CaO was determined in the obtained specimen of the material by titrating a dissolved sample of the lime in hydrochloric acid containing phenolphthalein.

In all cases the experiment showed that the process of carbonization occurred mainly (70 - 80%) during 1 hour and that the optimal temperature of the reaction of carbonization was within 200° - 300°C. Longer exposures caused a decrease in the percent of carbonization, especially at high temperatures (400°C). Apparently the reversible character of the reaction produces this effect in these cases. The obtained specimens of the carbonization product for the case of the original pressed powders of CaO demonstrated a sufficiently high strength. However, the entire specimen as a rule was not monolithic as a consequence of the cracks that formed. We must assume that stronger and more monolithic specimens can be obtained by adding various binding fillers to the

starting calcium oxide.

Thus, preliminary experiments on the reaction of CaO with CO_2 in the presence of water vapor showed that a further study of this process is worthwhile in order to obtain new construction materials on the basis of finely dispersed calcium oxide.

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